

**Conservation Measures to Avoid, Minimize, and Compensate Adverse Impacts  
on Sacramento River Winter-run Chinook Salmon for Inclusion in MSCS Attachment Table E-1.**

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| 1. | Implement applicable conservation measures to avoid, minimize, and compensate impacts on Sacramento River winter-run chinook salmon listed in MSCS Attachment D "Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures", Table D-19 "Anadromous Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures".  |
| 2. | Coordinate and maximize water supply system operations flexibility to provide water flow and temperature needs of winter-run in natal, rearing, and migratory habitat in areas upstream of the Delta. Reservoir operations should be conducted in a manner that ramps flow fluctuations sufficient to avoid juvenile stranding and redd de-watering.  |
| 3. | Avoid or minimize channel modifications during time periods of winter-run vulnerability or in important natal, rearing, and migratory habitats which may result in habitat degradation and diminished habitat connectivity.   |
| 4. | Operate new and existing diversions to avoid or minimize adverse effects on winter-run. Maximize consolidation of diversion structures along the Sacramento River system and in the Delta. All diversions that may take winter-run shall be screened in accordance with NMFS/ DFG fish screen criteria.   |
| 5. | Coordinate and maximize water supply system operations flexibility provided for by the Environmental Water Account and CVPIA b(2) water to avoid, minimize, and compensate for impacts to winter-run due to diversion effects in the Delta and to maximize survival of rearing and migrating winter-run. Water transfers should not be conducted during time periods when winter-run are highly vulnerable to entrainment/loss at CVP/SWP export facilities or when upstream and Delta habitat may be adversely affected. |
| 6. | Fully adhere to the terms and conditions in all existing or revised biological opinions related CVP OCAP.   |
| 7. | Install and operate the Head of Old River barrier and flow control barriers in the south Delta in a manner that avoids or minimizes adverse hydrodynamic effects that decrease survival of rearing and migrating juvenile winter-run. Operation of the barriers shall avoid or minimize the re-direction of migrating fish and should not be an impediment to migration. Operation of the barriers shall minimize or avoid the entrapment of winter-run upstream of the flow control barriers.                            |

**Conservation Measures to Avoid, Minimize, and Compensate Adverse Impacts  
on Central Valley Fall/Late Fall-Run Chinook Salmon for Inclusion in MSCS Attachment Table E-1.**

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| 1. | Implement applicable conservation measures to avoid, minimize, and compensate impacts on Central Valley fall/late fall-run chinook salmon listed in MSCS Attachment D "Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures", Table D-19 "Anadromous Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures".  |
| 2. | Coordinate and maximize water supply system operations flexibility to provide water flow and temperature needs of fall/late fall-run in natal, rearing, and migratory habitat in areas upstream of the Delta. Reservoir operations should be conducted in a manner that ramps flow fluctuations sufficient to avoid juvenile stranding and redd de-watering.  |
| 3. | Avoid or minimize channel modifications during time periods of fall/late fall-run vulnerability or in important natal, rearing, and migratory habitats which may result in habitat degradation and diminished habitat connectivity.   |
| 4. | Operate new and existing diversions to avoid or minimize adverse effects on fall/late fall-run. Maximize consolidation of diversion structures along the Sacramento River/San Joaquin River system and in the Delta. All diversions that may take fall/late fall-run shall be screened in accordance with NMFS/ DFG fish screen criteria.   |
| 5. | Coordinate and maximize water supply system operations flexibility provided for by the Environmental Water Account and CVPIA b(2) water to avoid, minimize, and compensate for impacts to fall/late fall-run due to diversion effects in the Delta and to maximize survival of rearing and migrating fall/late fall-run. Water transfers should not be conducted during time periods when fall/late fall-run are highly vulnerable to entrainment/loss at CVP/SWP export facilities or when upstream and Delta habitat may be adversely affected. |
| 6. | Manage operations at the Red Bluff Diversion Dam to improve adult fall/late fall-run fish passage, reduce the level of predation on juvenile fish, and increase adult and juvenile fish survival. Close the DCC from November through January to increase net freshwater inflow into the western Delta from the Sacramento River to improve transport of juvenile fall/late fall-run to the Western Delta and Suisun Bay while maintaining Delta water quality standards.   |

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on Central Valley Fall/Late Fall-Run Chinook Salmon for Inclusion in MSCS Attachment Table E-1.**

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| 7.  | Install and operate the Head of Old River barrier and flow control barriers in the south Delta in a manner that avoids or minimizes adverse hydrodynamic effects that decrease survival of rearing and migrating juvenile fall/late fall-run. Operation of the barriers shall avoid or minimize the re-direction of migrating fish and should not be an impediment to migration. Operation of the barriers shall minimize or avoid the entrapment of fall/late fall-run upstream of the flow control barriers.   |
| 8.  | For all in-channel and near-channel construction activities, limit construction to time-periods of minimal species vulnerability; implement construction BMPs, implement conservation measures in the 404 NWP, GPs, and PL84-99 U.S. Army Corps of Engineers (USACE) flood relief Biological Opinions. CALFED actions, including bank protection of in-channel islands, construction of attached berms and levee program actions, shall avoid, minimize and compensate all adverse impacts to instream, shallow-water, riparian and shaded riverine aquatic habitats. Compensation measures shall include restoration of in-kind habitats such that the functional values of each acre of affected habitat are replaced, resulting in a net gain in the extent and connectivity of these habitats for migrating, rearing and feeding fall/late fall-run. |
| 9.  | Implement construction BMPs including stormwater pollution prevention plans, toxic materials control and spill response plans, vegetation protection plans, and restrictions on materials used in channel and on levee embankments.  |
| 10. | Before implementing CALFED actions that require dredging, dredge materials should be tested to determine presence of materials deleterious to fall/late fall-run. Only sediment meeting all water quality standards and free from toxic substances in toxic amounts should be accepted for aquatic disposal.   |
| 11. | Avoid or minimize dredging within 200 feet of the shoreline and 250 feet of any water 4 feet deep or less (mean low low water [MLLW]) in Suisun Bay and the western Delta (west of the confluence of the Sacramento and San Joaquin Rivers).   |

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**Conservation Measures to Avoid, Minimize, and Compensate Adverse Impacts  
on Central Valley Fall/Late Fall-Run Chinook Salmon for Inclusion in MSCS Attachment Table E-1.**

12. Avoid the use of creosote pilings for constructing in-channel structures. Any combination of wood, plastic, concrete or steel pilings is acceptable provided there are no coatings, or treatments that may leach into the surrounding environment and adversely affect aquatic organisms.

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**Conservation Measures to Avoid, Minimize, and Compensate Adverse Impacts  
on Central Valley Spring-run Chinook Salmon for Inclusion in MSCS Attachment Table E-1.**

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| 1. | Implement applicable conservation measures to avoid, minimize, and compensate impacts on Central Valley spring-run chinook salmon listed in MSCS Attachment D "Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures", Table D-19 "Anadromous Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures".  |
| 2. | Coordinate and maximize water supply system operations flexibility to provide water flow and temperature needs of spring-run in natal, rearing, and migratory habitat in areas upstream of the Delta. Reservoir operations should be conducted in a manner that ramps flow fluctuations sufficient to avoid juvenile stranding and redd de-watering.  |
| 3. | Avoid or minimize channel modifications during time periods of spring-run vulnerability or in important natal, rearing, and migratory habitats which may result in habitat degradation and diminished habitat connectivity.   |
| 4. | Operate new and existing diversions to avoid or minimize adverse effects on spring-run. Maximize consolidation of diversion structures along the Sacramento River system and in the Delta. All diversions that may take spring-run shall be screened in accordance with NMFS/ DFG fish screen criteria.   |
| 5. | Coordinate and maximize water supply system operations flexibility provided for by the Environmental Water Account and CVPIA b(2) water to avoid, minimize, and compensate for impacts to spring-run due to diversion effects in the Delta and to maximize survival of rearing and migrating spring-run. Water transfers should not be conducted during time periods when spring-run are highly vulnerable to entrainment/loss at CVP/SWP export facilities or when upstream and Delta habitat may be adversely affected.   |
| 6. | Fully adhere to the terms and conditions in all existing or revised biological opinions related CVP OCAP. Manage operations at the Red Bluff Diversion Dam to improve adult spring-run fish passage, reduce the level of predation on juvenile fish, and increase adult and juvenile fish survival. Close the DCC from November through January to increase net freshwater inflow into the western Delta from the Sacramento River to improve transport of juvenile spring-run to the Western Delta and Suisun Bay while maintaining Delta water quality standards. |

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on Central Valley Spring-run Chinook Salmon for Inclusion in MSCS Attachment Table E-1.**

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| 7.  | Install and operate the Head of Old River barrier and flow control barriers in the south Delta in a manner that avoids or minimizes adverse hydrodynamic effects that decrease survival of rearing and migrating juvenile spring-run. Operation of the barriers shall avoid or minimize the re-direction of migrating fish and should not be an impediment to migration. Operation of the barriers shall minimize or avoid the entrapment of spring-run upstream of the flow control barriers.   |
| 8.  | For all in-channel and near-channel construction activities, limit construction to time-periods of minimal species vulnerability; implement construction BMPs, implement conservation measures in the 404 NWP, GPs, and PL84-99 U.S. Army Corps of Engineers (USACE) flood relief Biological Opinions. CALFED actions, including bank protection of in-channel islands, construction of attached berms and levee program actions, shall avoid, minimize and compensate all adverse impacts to instream, shallow-water, riparian and shaded riverine aquatic habitats. Compensation measures shall include restoration of in-kind habitats such that the functional values of each acre of affected habitat are replaced, resulting in a net gain in the extent and connectivity of these habitats for migrating, rearing and feeding spring-run. |
| 9.  | Implement construction BMPs including stormwater pollution prevention plans, toxic materials control and spill response plans, vegetation protection plans, and restrictions on materials used in channel and on levee embankments.  |
| 10. | Before implementing CALFED actions that require dredging, dredge materials should be tested to determine presence of materials deleterious to spring-run. Only sediment meeting all water quality standards and free from toxic substances in toxic amounts should be accepted for aquatic disposal.   |
| 11. | Avoid or minimize dredging within 200 feet of the shoreline and 250 feet of any water 4 feet deep or less (mean low low water [MLLW]) in Suisun Bay and the western Delta (west of the confluence of the Sacramento and San Joaquin Rivers).   |

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12. Avoid the use of creosote pilings for constructing in-channel structures. Any combination of wood, plastic, concrete or steel pilings is acceptable provided there are no coatings, or treatments that may leach into the surrounding environment and adversely affect aquatic organisms.

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**Conservation Measures to Avoid, Minimize, and Compensate Adverse Impacts  
on Central Valley Steelhead for Inclusion in MSCS Attachment Table E-1.**

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|----|---|
| 1. | Implement applicable conservation measures to avoid, minimize, and compensate impacts on Central Valley steelhead listed in MSCS Attachment D "Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures", Table D-19 "Anadromous Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures".  |
| 2. | Coordinate and maximize water supply system operations flexibility to provide water flow and temperature needs of steelhead in natal, rearing, and migratory habitat in areas upstream of the Delta. Reservoir operations should be conducted in a manner that ramps flow fluctuations sufficient to avoid juvenile stranding and redd de-watering.   |
| 3. | Avoid or minimize channel modifications during time periods of steelhead vulnerability or in important natal, rearing, and migratory habitats which may result in habitat degradation and diminished habitat connectivity.  |
| 4. | Operate new and existing diversions to avoid or minimize adverse effects on steelhead. Maximize consolidation of diversion structures along the Sacramento River/San Joaquin River system and in the Delta. All diversions that may take steelhead shall be screened in accordance with NMFS/ DFG fish screen criteria.   |
| 5. | Coordinate and maximize water supply system operations flexibility provided for by the Environmental Water Account and CVPIA b(2) water to avoid, minimize, and compensate for impacts to steelhead due to diversion effects in the Delta and to maximize survival of rearing and migrating steelhead. Water transfers should not be conducted during time periods when steelhead are highly vulnerable to entrainment/loss at CVP/SWP export facilities or when upstream and Delta habitat may be adversely affected.                                    |
| 6. | Fully adhere to the terms and conditions in all existing or revised biological opinions related CVP OCAP. Manage operations at the Red Bluff Diversion Dam to improve steelhead fish passage, reduce the level of predation on juvenile fish, and increase adult and juvenile fish survival. Close the DCC from November through January to increase net freshwater inflow into the western Delta from the Sacramento River to improve transport of steelhead smolts to the Western Delta and Suisun Bay while maintaining Delta water quality standards. |

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**Conservation Measures to Avoid, Minimize, and Compensate Adverse Impacts  
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| 7.  | Install and operate the Head of Old River barrier and flow control barriers in the south Delta in a manner that avoids or minimizes adverse hydrodynamic effects that decrease survival of steelhead. Operation of the barriers shall avoid or minimize the re-direction of migrating fish and should not be an impediment to migration. Operation of the barriers shall minimize or avoid the entrapment of steelhead upstream of the flow control barriers.   |
| 8.  | For all in-channel and near-channel construction activities, limit construction to time-periods of minimal species vulnerability; implement construction BMPs, implement conservation measures in the 404 NWP, GPs, and PL84-99 U.S. Army Corps of Engineers (USACE) flood relief Biological Opinions. CALFED actions, including bank protection of in-channel islands, construction of attached berms and levee program actions, shall avoid, minimize and compensate all adverse impacts to instream, shallow-water, riparian and shaded riverine aquatic habitats. Compensation measures shall include restoration of in-kind habitats such that the functional values of each acre of affected habitat are replaced, resulting in a net gain in the extent and connectivity of these habitats for migrating, rearing and feeding steelhead. |
| 9.  | Implement construction BMPs including stormwater pollution prevention plans, toxic materials control and spill response plans, vegetation protection plans, and restrictions on materials used in channel and on levee embankments.   |
| 10. | Before implementing CALFED actions that require dredging, dredge materials should be tested to determine presence of materials deleterious to steelhead. Only sediment meeting all water quality standards and free from toxic substances in toxic amounts should be accepted for aquatic disposal.   |
| 11. | Avoid or minimize dredging within 200 feet of the shoreline and 250 feet of any water 4 feet deep or less (mean low low water [MLLW]) in Suisun Bay and the western Delta (west of the confluence of the Sacramento and San Joaquin Rivers).  |

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on Sacramento River Winter-run Chinook Salmon for Inclusion in MSCS Attachment Table E-1.**

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| 1. | Implement applicable conservation measures to avoid, minimize, and compensate impacts on Sacramento River winter-run chinook salmon listed in MSCS Attachment D "Summary of Potential Beneficial and Adverse Program Effects and Conservation Measures", Table D-19 "Anadromous Fish Group: Summary of Potential Beneficial and Adverse CALFED Effects and Conservation Measures".  |
| 2. | Coordinate and maximize water supply system operations flexibility to provide water flow and temperature needs of winter-run in natal, rearing, and migratory habitat in areas upstream of the Delta. Reservoir operations should be conducted in a manner that ramps flow fluctuations sufficient to avoid juvenile stranding and redd de-watering.  |
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| 6. | Fully adhere to the terms and conditions in all existing or revised biological opinions related CVP OCAP.   |
| 7. | Install and operate the Head of Old River barrier and flow control barriers in the south Delta in a manner that avoids or minimizes adverse hydrodynamic effects that decrease survival of rearing and migrating juvenile winter-run. Operation of the barriers shall avoid or minimize the re-direction of migrating fish and should not be an impediment to migration. Operation of the barriers shall minimize or avoid the entrapment of winter-run upstream of the flow control barriers.                            |

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| 8.  | For all in-channel and near-channel construction activities, limit construction to time-periods of minimal species vulnerability; implement construction BMPs, implement conservation measures in the 404 NWP, GPs, and PL84-99 U.S. Army Corps of Engineers (USACE) flood relief Biological Opinions. CALFED actions, including bank protection of in-channel islands, construction of attached berms and levee program actions, shall avoid, minimize and compensate all adverse impacts to instream, shallow-water, riparian and shaded riverine aquatic habitats. Compensation measures shall include restoration of in-kind habitats such that the functional values of each acre of affected habitat are replaced, resulting in a net gain in the extent and connectivity of these habitats for migrating, rearing and feeding winter-run. |
| 9.  | Implement construction BMPs including stormwater pollution prevention plans, toxic materials control and spill response plans, vegetation protection plans, and restrictions on materials used in channel and on levee embankments.  |
| 10. | Before implementing CALFED actions that require dredging, dredge materials should be tested to determine presence of materials deleterious to winter-run. Only sediment meeting all water quality standards and free from toxic substances in toxic amounts should be accepted for aquatic disposal.   |
| 11. | Avoid or minimize dredging within 200 feet of the shoreline and 250 feet of any water 4 feet deep or less (mean low low water [MLLW]) in Suisun Bay and the western Delta (west of the confluence of the Sacramento and San Joaquin Rivers).   |
| 12. | Avoid the use of creosote pilings for constructing in-channel structures. Any combination of wood, plastic, concrete or steel pilings is acceptable provided there are no coatings, or treatments that may leach into the surrounding environment and adversely affect aquatic organisms.  |

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